Physica Status Solidi (A) Applied Research 2004 vol.201 N15, pages 3350-3353

FMR study of strain-induced magnetic anisotropies in CrO2 thin films

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Abstract

Epitaxial CrO2 thin films were grown on TiO2 (100) single-crystalline substrates by chemical vapour deposition (CVD) process with use of CrO3 solid precursor. The films with different thickness (27-530 nm) were studied by Ferromagnetic Resonance (FMR) technique. Strong dependence of FMR signal on the film thickness was observed in the series of CrO2 films deposited onto the pre-etched TiO2 substrates. It is shown that the magnetic behaviour of the CrO2 films arises from competition between magnetocrystalline and strain anisotropies that favour the [001] and [010] magnetization directions, respectively. For the thinnest film the strain anisotropy dominates, and the magnetic easy axis switches from [001] to the [010] direction. On the contrary, the CrO2 film grown on the unetched substrate demonstrates essentially strain-free magnetic anisotropy behaviour.

http://dx.doi.org/10.1002/pssa.200405521